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he either lay quiet or rose and stalked back to his own corner as if offended. Some might take it that his conduct indicated a fondness for company, or the possession of grateful feelings, or even an affectionate disposition; but it is not necessary in explanation of Snap's deportment to go beyond his desire for food. In the satisfaction of his hunger his interest in human beings departed. His doings are here put forward in support of nothing except that with proper treatment the snapping tortoise, one of the lowest and least likely of the tortoises, may lose his timidity, his ferocity disappearing in consequence, and become susceptible of a considerable amount of training.

S. GARMAN.

Mus. Comp. Zool., Cambridge, Mass.

Snow Rollers.

THE article of Dr. Claypole, in *Science* No. 522, on "Snow Rollers," recalls what I saw a few years ago. The condition was like that described by Mr. Hart. There was a smooth crust of snow on which a light fall of damp snow fell. The wind changed suddenly to the north, blew hard, and I saw scores and perhaps hundreds of these snow rollers forming. The wind simply blew them along and they formed just as boys roll snowballs. I feel sure such occurrences are not uncommon here. These rollers were several inches in diameter.

D. S. KELLOGG.

Plattsburgh, N. Y., Feb. 9.

The Antiquity of Man.

IN "Current Notes on Anthropology.—xxii." (*Science*, Feb. 10, 1893), Dr. Brinton has referred to certain discussions that took place at the meeting of the German Anthropological Association last August. Not having yet seen the report of that meeting, I cannot judge how far Dr. Brinton may have been misled by his authorities, but I wish to enter a decided protest as to two statements made by him. Let me premise by saying that it seems to me that it behooves Americans to maintain a strict neutrality in the international jealousies between the Germans and the French.

In regard to the importance to be attached to the celebrated "Neanderthal skull," it seems to be sufficient that it has been adopted by De Quatrefages and Hamy to set all the Germans, except Schaffhausen, against it. I did not expect, however, to find an American using such language as this about it: "The Neanderthal skull . . . was not dug up at all, but was picked up in a gully, which had been washed in the mountain side, and came from dear knows where. Probably there had been an old graveyard further up the hill, but by no means one in quaternary times." I will quote the exact language of Dr. Fuhlrott, the discoverer, describing the circumstances under which it came to light. "In a wild ravine, called the Neanderthal, cleft in the Devonian limestone, is a small cavern, about eleven feet long, ten broad, and eight high, opening upon an almost vertical wall of rock about sixty feet above the level of the stream [flowing through it]. . . . The ravine has been quarried for marble. In the cavern is a bed of clay, a glacial deposit, almost as hard as stone. In this clay, at a depth of two feet, in August, 1856, a human skeleton was discovered," etc. (Hamy, "Préhis de Paléontologie Humaine," p. 237). The real question in regard to these human remains is, in the words of Schaffhausen, "Whether the cavern in which they were found, unaccompanied with any trace of human art, were the place of their interment, or whether, like the bones of extinct animals elsewhere, they had been washed into it" (*Natural History Review*, 1861, p. 172). In all serious discussions it is well to stick close to the facts of the case.

The other subject, about which I dissent from Dr. Brinton's conclusions, is in regard to what he calls "the delineation of a mammoth on a bone from the Lena cave in the south of France. This was not discussed, being probably considered of questionable origin." I must own that at first I was somewhat puzzled to know just what Dr. Brinton meant by "the Lena cave in the south of France." But on looking into the recently published English translation of the Marquis de Nadaillac's "Prehistoric Peoples," p. 119, Fig. 38, sure enough, I found an engraving representing a "Mammoth or elephant from the Lena cave." Now this remarkable designation is not due to the author, who calls it

a "Mammoth ou elephant de la Lena," referring to the well-known discovery in 1799 of the body of a mammoth, imbedded in the frozen banks of the river Lena, in Siberia. I suppose that scarcely any relic of antiquity is better known to pre-historic archaeologists than the remarkable delineation of a mammoth upon a plate of fossil ivory, discovered by Edward Lastet, in May, 1864, in the cavern of the Madelaine (Dordogne), in southern France. It was made in the immediate presence of M. de Verneuil and of Dr. Falconer, and an account of the circumstances of the discovery was given by him in a letter to Milne Edwards, published in the *Annales des Sciences Naturelles*, 5e. ser., T. iv. (Zool.), 1865, pp. 353-356. That even international jealousy should "question its origin" surpasses belief.

HENRY W. HAYNES.

Boston, Feb. 16.

Birds in Severe Cold Weather.

DURING the recent severe cold weather, as one of the high-school students was on his way through the belfry of the building to hoist the weather signals, he discovered a small bronze owl perched above one of the windows. It had evidently been drawn thither by the heat from the chimneys and pigeons which frequent the ventilators. On being captured by the janitor, on the day following, the bird made no resistance. It was put into a cage, to be kept for the zoölogy class. It lived but one brief day, and it was found to be emaciated and evidently died of weakness and sheer exhaustion. The taxidermist who stuffed it said that it was only one of a large number recently brought to him as victims of the cold spell. Many were found frozen in barns, and had been driven by the cold from the woods to the city.

Large numbers of snow-birds, crows, as well as English sparrows, were hovering about grain elevators, the glass works, and other similar buildings for warmth and food all through the cold period. The gathering of birds about warm chimneys, etc., in such large numbers was something unusual.

E. R. WHITNEY.

Binghamton, N. Y.

Miocene Group of Alabama.

SINCE sending you a contribution on the Miocene Group of Alabama, Dr. Wm. Dall of the Smithsonian, to whom the fossils collected had been submitted, has returned his report, naming the most of them and declaring his opinion, that they are rather of the older than a younger Miocene. This will better suit the geographical position and other facts detailed of the Grand Gulf. His final determination will be published in the Alabama Report.

LAWRENCE C. JOHNSON.

Meridian, Miss., Feb. 13.

Mule-footed Hogs.

MR. J. F. RITTER of Higginsville, Mo., sends me a hog's foot, which to me is something new. It has the two larger hoofs united into one. The bones above are separate but the hoofs wholly united. He states that a farmer of the vicinity has a drove of these mule-footed hogs. By crossing breeds he has some with two cloven feet and two mule feet. I should like to know whether this is a common occurrence, or is it something new?

JNO. H. FRICK.

Warrenton, Mo., Feb. 11.

BOOK-REVIEWS.

A Manual of Bacteriology. By GEORGE M. STERNBERG, M.D. New York, William Wood & Co. 886 p. 8°. \$7.

THE results of the bacteriological investigation of the past decade, when massed in a huge volume like the one before us, are calculated to arouse the keenest admiration for the talent and industry that have produced them. Even in this period of breakneck *temps* in all lines of human activity and thought the progress of bacteriology seems to the world at large truly marvellous. Every year, we may almost say every month, witnesses some discovery of untold practical value. If a last word had

been needed to convince the "practical man" of the ultimate advantage to the race of "pure" science and "pure" investigation that word would have been added in these latter days by the development of the science of bacteriology. To have given to the world for the first time a rational theory of infectious disease, and to have indicated the therapeutic possibilities of the future are achievements that may well make the last quarter of the nineteenth century memorable in the history of human progress.

It is eminently fitting that Dr. Sternberg, who has himself done much to increase our knowledge of bacteriology, and who was one of the pioneers in the work in this country, should give to the English-reading public their first adequate survey of the bacteriological field. His manual at once takes its place as the standard bacteriology in the English language.

The bulky volume of 886 pages is divided into four parts, the first treating of classification, morphology, and general bacteriological technology; the second of general biological character; the third of pathogenic bacteria, and the fourth of saprophytes. An invaluable bibliography, covering over 100 pages, and an index conclude the volume. The press-work is on the whole excellent, but we must enter our protest against the thickness of the paper used. A thinner paper would have given even greater satisfaction to the eye, while its use would have considerably reduced the awkward size of the book. The use of needlessly thick paper, however, is so common a failing of American book-makers that it is perhaps hypercritical to bring it up in this instance. The plates and text figures are executed in an unusually satisfactory manner, and the photomicrographs are of the high degree of excellence to be expected from one as expert in the technique of photomicrography as the author of this book.

Among the most timely and practical portions of the manual may be mentioned the chapters on antiseptics and disinfectants, the influence of physical agents upon bacteria, the practical direction for disinfection, etc. Lengthy quotation is made from the Report of the Committee on Disinfectants appointed by the American Public Health Association, principally to keep before the public the high merit of chloride of lime as a ready and reliable disinfectant. Reference is made, also, to the use of fresh bread for rubbing down the walls of an infected apartment. This method is based on experiments of Esmarch, which seem to indicate that this is the most reliable way of removing bacteria from the walls and ceilings of infected rooms.

A long and studied chapter is devoted to the consideration of the vital questions of susceptibility and immunity. Dr. Sternberg, while disposed to accord to phagocytosis an important rôle in some diseases, is profoundly impressed — as are most bacteriologists — by the remarkable evidence adduced during the last few years in support of the "anti-toxine" theory. It is becoming more and more probable that Metschnikoff's brilliant phagocyte theory embodies at most only a partial explanation of the facts of immunity. "The experimental evidence detailed," says Dr. Sternberg, "gives strong support to the view that *acquired immunity depends upon the formation of anti-toxines in the bodies of immune animals.*"

The sections devoted to the description of such bacteria as have a recognized pathogenic significance are compiled with the fullest reference to recent investigations. Some students may, however, wish that the wealth of material had been more critically arranged and more exhaustively indexed.

A great boon to the student of bacteria from the botanical and systematic side will be the descriptions of the common bacteria of air, water, and soil. Only those who have attempted to compare and identify forms encountered in every-day experience are aware of the labor involved in the compilation of these data. Dr. Sternberg's work ought to give a strong impetus to the movement to bring order out of the existing chaos of vague "species" and vaguer "forms."

As is well-nigh inevitable in a book covering so much ground — and ground, too, that is shifting under one's feet — various errors of omission and commission are apparent. In the first place, it is evident that the index to a work of such magnitude should be thoroughgoing and should not shrink from numerous cross-references. The fact that the index before us contains

under the heading "Cholera" no reference to the pages dealing with Asiatic cholera (pp. 500-509), a topic which at present is always with us, indicates opportunities for expansion. The reader who turns the pages and sees something about "alexines" (p. 261) and something about "splenic fever" (p. 327) will find in the index no entry under either of these heads.

Among oversights in proof-reading may be mentioned the substitution of "Chamberlain" for "Chamberland" (pp. 57-59), the use of "aerobic" and "anaerobic" for the more usual nouns "aerobe" and "anaerobe" (pp. 78-83), "micrography" for "micrographie" (p. 8), etc. On page 237 is a singularly involved translation from a memoir by Pasteur. The following sentences fairly represent the style: "The fowls are then in the constitutional state of fowls not subject to be attacked by the disease. These last are as if vaccinated from birth for this malady, because the foetal evolution has not introduced into their bodies the material necessary to support the life of the microbe, or these nutritive materials have disappeared at an early age."

These blemishes, however, do not seriously mar the general excellence of the manual. It is to be hoped that Dr. Sternberg may see his way clear to the preparation of successive editions of this valuable work. In a science that is advancing so rapidly as bacteriology, new facts are constantly coming to light and compelling frequent revision of our views. Dr. Sternberg has brought the present volume well up to the latest researches and thus encourages us to hope for a second edition as soon as the progress of bacteriology shall demand it.

Discussion of the Precision of Measurements. By SILAS W. HOLMAN, S.B. New York, John Wiley & Sons, 1892. 176 p. 8°. \$2.

PROFESSOR HOLMAN, perhaps even more than the average physicist of experience in experimental work, has made a specialty of the science of exact measurements. His work, like that of Dr. A. M. Mayer and of Dr. Rowland, has involved, more than is common, the application of refined methods of determinations of quantity to the investigation of those insensible physical phenomena which ordinary modes of measurement are incompetent even to reveal; methods formerly little known or practised in this country, but now familiar to the younger physicists through the work of these leaders in this department of research. In the volume before us are collected a series of articles originally prepared for the *Technology Quarterly* and *Electrical Engineer*, revised and given more complete and formal shape for permanent preservation, and for the use of students and their instructors, both in pure physics and in the applied science of the engineer. These studies are valuable, not only as giving useful knowledge and power of accomplishment of professional work, but as stimulating the young aspirant for learning and reputation and giving him an attitude of mind in itself desirable and fruitful of good result. As remarked by its author, "An experimental result whose reliability is unknown is nearly worthless. The grade of accuracy of a measurement must be adapted to the purpose for which the result is desired. The necessary accuracy must be secured with the least possible expenditure of labor. These statements apply no less to the roughest than to the most elaborate work which the engineer is called upon to perform; they are no more true of refined scientific research than of ever-day engineering and industrial practice." The book is thus of especial value to both classes, whose methods, indeed, are daily becoming more and more alike in their refinements, and in their purposes and applications. In modern researches, especially, in the development of the phenomena underlying the operation of the steam-engine, in the construction of the dynamo-electric machine, in the transfer and transformation of energies, of whatever kind, the contemporary engineer and physicist are working together, and sometimes each doing important work in the special field reserved to the other. Especially is this the fact in electrical physics, in which branch the department of pure science occupied by the physicist and that of applied science which constitutes engineering, blend insensibly, and their work is performed, within a large area of boundary territory, by members of both professions alike. The electrician is sometimes confounded with the electrical engi-